TITLE OF INVENTION

The ED Ergonomically Designed Walker

Inventor: Joseph F. Schrader
22 Pearl St
New Hartford NY 13413
US citizen

Field of Search 135/65, 66, 67, 68, 69, 72
297/6; 272/70.3, 144, 134; 623/27, 28, 29, 30, 31, 32

REFERENCES CITED

U.S. Patents

4,641,882	2/1987	Young
5,178,595	1/1993	McGregor
5,524,658	6/1996	Schrader

Foreign Patents

2611492	9/1988	France
4034755	5/1992	Germany
2012315	5/1994	Russian Federation

BACKGROUND OF THE INVENTION

When an injury to the lower leg, knee or foot or a leg amputation occurs, a wheelchair or crutches is the usual means for ambulating. The present invention relates generally to a seated crutch that has handles and is ergonomically designed to promote balance and the natural position of the user.

There are a great number of orthopedic devices such as crutches and canes, the like of which have been satisfactory only to a certain extent. These devices help an injured person ambulate but do not take into account a person's need for natural positioning and balance while walking. When walking, the human body has its mass in motion. When this happens a number of factors come into play. This is best

understood by using the model of a downhill skier. In order for the skier to maintain balance while in motion he needs to have a natural stance with his feet slightly apart and he needs to lean forward slightly, bending the ankles, knees and hips with elbows, wrists and hands forward of the hips. This gives the body a slight forward lean with dynamic joint alignment, promoting better balance.

Medical devices have been developed to facilitate ambulating. U.S. Patent No. 4,641,882 issued February 10, 1987 to John Young and entitled "orthopedic appliances" is for a device with a straight vertical seated post with a leg peg to support the injured leg, one or more handles mounted below the seat and a C-shaped leg receiver. The structure is quite simple by nature. A person sits on the seat, rests his foot on the peg and holds the forward and rear handles. Little consideration has been given to the problem of maintaining balance and keeping the body in a natural, flexible stance. Furthermore the foot peg could be detrimental if non-weight bearing of the injured limb is necessary. The straight shaft, although simple, does not address the need for a tip underneath the injured limb to promote balance and stability.

U.S. Patent No. 5,524,658 issued June 11, 1996 to Joseph F. Schrader and entitled "sit to stand hinged seat walker with pull-up handles" also employs a vertical upright post with a planar seat that locks in a vertical position. The user's injured limb is strapped into the leg receiver. The straight V-shaped post from seat to tip is in a vertical line similar to Young's patent. Both of these devices allow the user to rest on the seat while walking.

It is the objective of this new and improved invention to provide an improved seated frame with raised forward handle grip bars to promote balance and with a leg cradle that the user may or may not strap on. The leg cradle is positioned in such a way that the injured limb helps promote balance. Due to the ergonomic bends in the walker frame, the seat support is offset from the stabilization foot, allowing the user to walk more normally while supporting the injured limb but not necessarily having to rest on the seat at all times. This balancing frame works similarly to a bicyclist riding along above the seat using his leg muscles to support the upper body, which in turn strengthens muscles.

Young and old alike would benefit from this new improved walker frame. Due to the configuration of the leg cradle, the walker can be easily mounted from an upright position. The walker frame is now safer because an open leg frame cradles the injured limb and can be quickly removed if the need should arise.

BRIEF SUMMARY OF THE INVENTION

The present invention relates generally to an ergonomically designed walking system that provides an inexpensive simplified structure consisting essentially of a vertical tubular frame with offset bends, that provides a post and seat with padded handle grips and adjustable padded hand grip bars located at the uppermost end of the walker frame. This tubular frame consists mainly of two tubular support members: the generally V-shaped seat support with handle assembly and the offset frame support post handle assembly located at the upper end with a stabilization foot assembly located at the lower most end. The stabilization foot assembly is locked in position with a safety collar assembly, which minimizes wear on the adjustment button. Located above this assembly are threaded frame spacers, which maintain the proper distance between these two support members giving the walker frame the proper positioning of the seat post over the stabilization foot, which gives the frame the proper lateral balance for the intended user. These threaded frame spacers line up with the welded reinforcement tubes, which are located in both support members. Button head bolts pass through the welded reinforcement tubes and thread into the female threaded frame spacers. The leg cradle support and pivot flange assembly also rely on the button head bolts and the welded reinforcement tubes for strength and rigidity. The adjustable leg cradle support tube with adjustment holes is located at the uppermost end of the leg cradle pivot flange assembly with the pivoting bracket affixed to the bottom of the padded leg cradle. This padded leg cradle may have a Velcro® strap or it may have a safety breakaway buckle.

The ergonomically designed walking frame solves a long-standing problem of being able to ambulate with little effort and at the same time being able to have a strong stable stance with balance that allows for proper joint positioning. The joints, muscles and tendons work in a more natural, comfortable state which promotes faster

healing because of the user's ability to extend and flex both the non injured limb and the injured limb maintaining muscle mass and minimizing atrophy. Being able to have extension and flexion helps to promote healing. The prior art is lacking. This walking device may be used in a number of different ways which include helping to rise from a seated position, as a traditional walker with hands on seat and handle grip bars for stability, climbing and going down stairs holding on to rear of the seat with one hand and grip bar with the other hand with the walker frame facing sideways on the steps. One can have the walker frame on the step above while going upstairs or the step below while going downstairs. It may also be used for walking, straddling the walker frame and seat assembly, resting on the seat only when needed. The walker enables the user to stand at a cabinet and have the widely spaced hand grip bars rest against the vertical surface, giving the user the use of his hands to do various tasks such as preparing food, brushing one's teeth or simply preparing a cup coffee. The object of this invention is to provide a simple to use device that is extremely adjustable for many users of different sizes with varying injuries. This would make it possible for the walker to be rented to those who would only need the device for a short time and then to be recycled back into use for another individual.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, reference is made to the accompanying drawings, in which:

FIG 1 is a side elevational view of the left injured leg walker frame with leg cradle and Velcro® strap or breakaway buckle supporting a phantom person missing left leg below the knee.

FIG 2 is a top view of the left injured limb walker frame.

FIG. 3 is a right side elevational view showing upstanding left injured limb walker frame.

FIG. 4 is a rear elevational of a left injured limb walker frame view of FIG. 3.

FIG. 5 is an enlarged view of the rotation axes of the pivot flange assembly taken along lines 5 – 5 of FIG.6 with letters B, C & D showing rotation directions of pivot flange joint. Letter A shows degree hash marks on leg cradle pivot flange assembly.

FIG. 6 is a left elevational view of FIG. 1 showing a left leg cradle without a Velcro strap or a phantom person.

FIG. 7 is an enlarged view of the padded leg cradle assembly with Velcro® strap taken along lines 7 – 7 of FIG. 6, with letter E showing direction of pivot rotation of leg cradle

FIG. 8 is a rear elevational view of FIG. 4 with wider threaded frame spacers to change the lateral balance point of the walking frame to accommodate a wider stabilization foot. Letter F shows lateral balance point.

FIG. 9 is a right elevational view of a walker frame for a right injured leg with letter J. showing forward balance point of frame over stabilization foot. Letter I shows the padded handgrip bars adjustment rotation.

FIG. 10 is a rear elevational view of FIG. 6 a right injured limb walker with shorter frame spacers. Letter G shows changed lateral balance point from Fig. 8 lateral balance point.

FIG. 11 is an enlarged view of the stabilization foot assembly taken along lines 11 – 11 of FIG. 10.

FIG. 12 is a rear elevational view of a right injured lamb walker with a right leg cradle assembly. Letter H shows lateral balance point to the left side of the stabilization foot.

FIG. 13 is a side elevational view of a person walking with left leg supported in a leg cradle.

FIG. 14 is a side elevational view of a person walking with the left injured walker frame with no leg cradle. The phantom person is using selective weight bearing on the left injured limb having normal extension flexion of both legs

FIG. 15 is a side elevational view of a person missing the lower portion of their leg using the left injured limb walker frame maintaining normal extension flexion of right leg.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in greater detail, Fig. 1 shows an improved ergonomically designed walker frame 51 made according to the invention supporting a

phantom person 42, with their left leg missing below the knee 43, coming to rest on stabilization foot 25, of walker frame 51. The individual is in a natural comfortable stance with hands 47, gripping padded handgrip bars 54, similar to that of U.S. Pat. No. 4,641,882. This improved walker frame facilitates the ability to control the balance of the individual in relationship to the stabilization foot 25. It should also be noted that the elbows 45, are at a comfortable distance apart with the shoulders 40, facing the direction of movement with a slight forward lean as one rests upon the seat assembly 64.

Referring now to Fig. 2, the walker is shown in a top view, with an Ed (stands for ergonomic design) walker frame 51, and shows the relationship between foot stabilization assembly 25 and seat assembly 64. The walker frame 51 is comprised principally of two tubular parts. An ergonomically configured offset frame support post 60 has a foot assembly 25, at lower end and padded handgrip bar 54 at the top vertical end. The offset seat post 61 has opposing hand grip bar 54 located at the most top vertical end.

Fig. 3 is a right side elevational view showing one of two padded handgrip bars 55 located at the upper end of support post 60. The adjustable padded handgrip bars 54 are affixed to the tapered top horizontal end of support post 60 and the V-shaped seat support 61 with the cap screw 56 located at the lower end of padded handgrip bars 54. The offset seat support post 61 is generally a V shaped tubular structure with bicycle seat 64 and is mounted on the highest vertical tapered end of said post with a bicycle seat adjustable mounting bracket 62, which clamps on the forward and aft adjustable seat bars 63.

Fig. 4 is a rear elevational view showing padded handgrips 55 located on the upper horizontal end of the offset seat post and handle assembly 61, with both offset frame support post 60 & offset seat post and handle assembly 61 being formed of lightweight high strength tubing such as aluminum, stainless steel, titanium, or a lightweight moldable composite material. A bicycle seat assembly 64 is mounted to the offset seat post and handle assembly 61. The offset ergonomically formed frame support post 60 with stabilization foot assembly 25 and V shaped seat support post with handle assembly 61 are held apart to a desired distance by threaded frame

spacers 59, to achieve proper lateral distance between offset frame support post 60 & offset seat post and handle assembly 61.

Fig.5 is an enlarged, detailed view taken on lines 5–5 from Fig. 6 but not showing the padded leg cradle assembly 33. The offset frame support post 60 and the V-shaped offset seat post and handle assembly 61 each have welded reinforced mounting tubes 58 spaced at equal distances apart to give added strength. Button head bolts 57, protruding latterly through these tubes into threaded frame spacers 59, can be tightened to the desired foot pounds without crushing or distorting frame support post 60 and handle assembly 61. The leg cradle pivot flange with offset bolt assembly 27 attaches to seat support 61 using a lengthened button head bolt 57 protruding through welded reinforcement tubes 58 located on offset seat support post 61, adjacent to gusset 71. Letter A distinguishes degree markings and hash marks on the leg cradle pivot flange with offset bolt assembly 27. Letter B shows the lateral rotation of the leg cradle pivot flange with offset bolt assembly 27. Letter C shows the vertical rotation of the leg cradle pivot flange with offset bolt assembly 27. The leg cradle adjustment barrel with holes 29 is inserted into the pivot cap flange 28 and locked into the desired rotation by setscrew 50. Letter D shows the rotation axis of the leg cradle adjustment barrel 29.

Fig. 7, taken from Fig. 6 along lines 7-7 is an enlarged mainly left side view showing in greater detail a padded leg cradle assembly 33, with optional Velcro® strap 34 in use in Fig. 1. This individual is affixed to the walker frame 51, which in some instances can be beneficial such as in climbing stairs. To secure frame to the individual, similar to that of U.S. patent 5,178,595, the improved leg cradle 33, has a pivoting bracket 32, attached by means of the button head bolt and Nylock® nut assembly 31 to leg cradle inner support tube with height adjustment spring button assembly 30. This tube is telescoping and is locked in position by a spring button assembly 35. As seen in Fig. 7, leg cradle support bracket 32 pivots at the top of inner support tube 30, with travel illustrated by letter E.

Fig. 8 is a rear elevational view of left injured limb walker frame 51, with larger threaded frame spacers 59. Reference line F shows the center of balance closer to the center of the stabilization foot assembly 25.

Fig. 9 shows a side elevational view of a walker 51 for a right leg injury. Reference line J. shows the vertical center balance point of the seat assembly 64 to stabilization foot assembly 25 forward of foot support tube 70.

Fig. 10 shows a rear elevational view of a left injured limb walker frame 51 with a left padded leg cradle assembly 33 with smaller threaded frame spacer 59. Reference line G. shows the vertical center balance line further to the right of the stabilization foot assembly 25 than shown in Fig. 8.

Fig. 11 refers to construction details view. Certain subassemblies of the invention show a fragmentary vertical section of an enlarged view. The series of height adjustment holes 65 spaced at equal distances, protruding through lower end of offset frame support post 60 are readily seen in U.S. Patent No. 5,178,595. FIG. 11 shows safety knob with threaded shaft 67, threading through safety collar assembly 66, diagonally passing through equally spaced height adjustment holes 65, in offset frame support post 60, also passing through equally spaced foot support tube holes 26, in foot support tube 70. This presses up against the inner support surface of tube 70, which presses outer surface of tube 70 to inner wall of offset frame support post 60, locking the two tubes together and giving a second means of fixing both tubes 60 and 70 to a desired height. Tightening the control knob 67 by hand can eliminate a slight amount of play between offset frame support post 60 and foot support tube 70. This will eliminate a clicking noise, which would be produced between these two support tubes and will minimize wear on the height adjustment button 68 thus promoting safety.

Located directly below in the next two aligned holes 26 & 65, is the height adjustment button and spring assembly 68 to accommodate different height requirements. Located at the end of support tube 70 is support tube cap 69, which is used as a smoothing device between the two tubular sections, frame support post 60 & foot support tube 70. It is also a protective stop by not allowing locking safety collar assembly 66 to slide off when loosened for adjustment, which promotes safety.

Fig. 11 shows greater detail of the stabilization foot assembly 25, which is comprised of a foot support tube 70, that is welded to upper stabilization plate 72, and one or more gussets 71 by means of a weld at right angles to achieve a 90 degree relationship between foot support tube 70 and upper stabilization plate with threaded

holes 72. It should be noticed that the tube 70 has been positioned forward of the rear trailing edge of plate 72, and centered similar to the proportions of the human foot. Located below mounting plate 72 is a thick layer of foam 23 which can vary in density to accommodate the weight of the injured individual. Located below foam 23 is the lightweight titanium or like stabilization plate 24, which is affixed to rubber tread with reinforcement cord 22, by means of contact cement or the like. The rubber tread with reinforcement cord 22 has four mounting holes, two in front and two in the rear. Rubber tread mounting bars 73, with equally spaced matching holes are placed over rubber tread 22. Mounting bar cap screws 21, pass through these aligned holes and thread into matching threaded holes in upper mounting plate 72. The rubber treads with cord wraps from the front to the rear of foot assembly 25, encapsulating the stabilization plate and foam in a tight, flat and secure manner. This stabilization foot assembly 25 can be made in varying sizes to facilitate a wider, more stable base for some users or a smaller, more lightweight base for the experienced user.

Fig. 12 shows a rear elevational view of a right injured limb walker frame 51, with reference line H showing the vertical balance point to the left side of stabilization foot assembly 25. It is imperative that the vertical balance point is adjusted closer to the uninjured limb that is used for ambulating. The walker frame then supports more weight under the injured limb with stabilization foot assembly 25 underneath the vertical balance point making it possible to move walker stabilization foot assembly 25 further away from the uninjured foot. This helps improve the walker's performance by offsetting the balance slightly, making the walker lean towards the uninjured foot while ambulating

Fig. 13 shows a phantom person using the improved ergonomically designed walker frame 51, with left lower leg demonstrating flexion 53, blow the knee 43, with a leg cradle with no Velcro® strap. One is able to mount the walker without attaching a strap and to ambulate without being strapped in, but merely resting upon leg cradle without being restrained. This new improved feature makes it far safer to get rid of the walker in case of fall.

Fig. 14 shows a phantom person using a left injured leg ergonomically designed walker frame 51, with no leg cradle, showing that it is possible to have extension 52 of

lower leg and flexion of both legs with normal range of motion of both legs, at the same time being able to selectively weight bear on the left injured leg.

Fig. 15 shows a phantom person using a left injured leg ergonomically designed walker frame 51, with leg cradle supporting a partial leg amputated below the knee with no Velcro® strap or breakaway buckles. The phantom person is standing at a normal height resting comfortably on the stabilization foot maintaining good balance. Fig. 1, 13, 14 and 15 all show phantom person demonstrating proprioception of the stabilization foot by means of wrist 39 and hand 47.

It should be understood that while the invention has been described for reference to the structure disclosed here in, it is not confined to the details set forth, and this application is intended to cover such modifications or changes as may be made from the forgoing without departing from the spirit and scope of the following appending claims.